DOCUMENT RESUME

ED 197 803 JC 810 107

AUTHOR Bohuslov, Esther Buchanan
TITLE An Examination of the Relationship of Grade Achievement to Students' Reading Comprehension Ability.
PUB DATE May 79
NOTE 35p.: Ed. D. Practicum, Nova University.

EDRS PRICE MF01/PC02 Plus Postage.
DESCRIPTORS *Academic Achievement: Algebra: College English: Community Colleges: Correlation: Grades (Scholastic): Literature Reviews: Readability: *Reading Achievement: *Reading Comprehension: *Textbooks: Textbook Selection: Two Year Colleges
IDENTIFIERS College of Alameda CA

ABSTRACT

A study involving students in two English classes and two algebra classes at the College of Alameda was conducted to assess the correlation between a student's grade achievement and his/her ability to read at the level at which the course text was written. The Fry Readability Scale was used to determine the reading level of the course texts and the Gates-MacGintie Reading Comprehension Test. Form 3, was administered to determine the reading comprehension grade level of each student. Each class was divided into a control group, composed of students with reading comprehension levels that were no more than one year below the level of the course text, and an experimental group, composed of students with reading comprehension levels more than one year below the level of the course text. After mean end-of-course grades were determined for each group, statistical analyses were conducted to determine if a significant difference (.05 level) existed between the mean grades of the two groups. The study findings revealed that the control groups in the English classes achieved significantly higher course grades than did the experimental groups. High attrition rates in the algebra classes, however, prevented a reliable statistical analysis for those courses. The study report reviews relevant literature, examines findings for each class, and discusses implications of the findings. (JP)

****
* Reproductions supplied by EDRS are the best that can be made *
* from the original document. *
****

ED197803

JC 810 107

AN EXAMINATION OF THE RELATIONSHIP OF GRADE ACHIEVEMENT TO STUDENTS' READING COMPREHENSION ABILITY

by

Esther Buchanan Bohuslov, M. A.

College of Alameda

"PERMISSION TO REPRODUCE THIS MATERIAL HAS BEEN GRANTED BY

Esther B. Bohuslov

TO THE EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)."

U.S. DEPARTMENT OF EDUCATION
NATIONAL INSTITUTE OF EDUCATION
EDUCATIONAL RESOURCES INFORMATION CENTER (ERIC)

☐ This document has been reproduced as received from the person or organization originating it.

☑ Minor changes have been made to improve reproduction quality.

• Points of view or opinions stated in this document do not necessarily represent official NIE position or policy.

A RESEARCH PRACTICUM PRESENTED TO NOVA UNIVERSITY IN PARTIAL FULFILLMENT OF THE REQUIREMENTS FOR THE DEGREE OF DOCTOR OF EDUCATION

NOVA UNIVERSITY

MAY, 1979

Abstract of a Practicum Presented to
Nova University in Partial Fulfillment of the
Requirements of the Degree of Doctor of Education

AN EXAMINATION OF THE RELATIONSHIP OF GRADE ACHIEVEMENT TO STUDENTS' READING COMPREHENSION ABILITY

by

Esther Buchanan Bohuslov, M. A.

May, 1979

High attrition and low achievement scores indicated that College of Alameda was not meeting the needs of many students. Some instructors felt that one possible reason for low achievement could be a result of inappropriate matching of the reading level of the material and the reading level of the student. This study was designed to answer the following question:

> Is there a significant difference in the grade achievement of students whose reading competency is one or more years below the grade level of the course text and the grade achievement of students whose reading competency is less than one year below the grade level of the course text?

Four classes were chosen. Each had an experimental group composed of students whose reading competency was greater than one year below the reading grade level of the text and a control group composed of students whose reading competency was less than one year below the reading level of the text. Mean achievement grades were tested for significant difference at the 0.05 level.

Results of the study showed that (1) each class tested showed a significant difference in reading level between the experimental and control group. This was considered a major contributing factor to the results of the t-test. (2) t-test values for grade achievement in both English classes exceeded critical values. Thus the null hypothesis was rejected, (3) the Pearson Product-Moment Correlation Coefficients were inconclusive because of nearness to critical value, and (4)high experimental mortality in the algebra classes precluded statistical analysis.

Based on the results of this study, it was recommended that (1) textual materials be tested for reading levels and the results be made available to students and faculty,(2) administration emphasize the importance of matching reading competency of students to reading level of class material, and (3) that reading competency level of students be determined.

TABLE OF CONTENTS

	Page
ABSTRACT	ii
THE STATEMENT OF THE PROBLEM	1
THE HYPOTHESIS	2
BACKGROUND AND SIGNIFICANCE OF THE STUDY	3
DEFINITIONS OF TERMS	9
LIMITATIONS OF THE STUDY	13
BASIC ASSUMPTIONS	13
PROCEDURES FOR COLLECTING DATA	14
PROCEDURES FOR TREATING THE DATA	16
DATA RESULTING FROM THE STUDY	18
TABLES:	
I. READING GRADE LEVEL OF CLASS MATERIALS	18
II. READING COMPETENCY GRADE LEVEL DATA FOR ENGLISH I CLASS	19
III. COURSE GRADE ACHIEVEMENT DATA FOR ENGLISH I CLASS	19
IV. PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENT GRADE ACHIEVEMENT VERSUS READING LEVEL FOR ENGLISH I	20
V. READING COMPETENCY GRADE LEVEL DATA FOR ENGLISH 10B CLASS	21
VI. COURSE GRADE ACHIEVEMENT DATA FOR ENGLISH 10B CLASS	21
VII. PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENT GRADE ACHIEVEMENT VERSUS READING LEVEL FOR ENGLISH 10B	22
VIII. READING COMPETENCY GRADE LEVEL DATA FOR ELEMENTARY ALGEBRA CLASS	23

IX. READING COMPETENCY GRADE LEVEL DATA FOR INTERMEDIATE ALGEBRA 23

X. COURSE COMPLETION DATA ELEMENTARY ALGEBRA 24

XI. COURSE COMPLETION DATA INTERMEDIATE ALGEBRA 24

CONCLUSIONS AND SIGNIFICANCE 25

REFERENCES 27

THE STATEMENT OF THE PROBLEM

With the ever increasing awareness of the vital connection between reading skills and academic achievement, educators are becoming more aware of the need to correlate the reading level of the student with the reading level of the textual material. "A student has the ability to read material at a certain level of difficulty; a teacher is responsible for providing material whose level of difficulty matches that ability" (Jorgenson, 18:24). This theory of instruction identified by Betts (2) is widely accepted by reading experts. See Harris & Sipay (13) Zintz (28). This matching principle of instruction is based on the assumption that if the assigned textual material is too difficult, it will lead the student to confusion, frustration, and failure. The most desirable learning situation is one in which "the learner is challenged but not frustrated" (Betts, 2:449) and "works smoothly at his own level of accomplishment" (Bond, 3:46).

To ascertain the merit of this principle of matching material to the ability of the students, the following question was considered:

> Is there a significant difference in grade achievement of students whose reading competency is no more than one year below the grade placement of the course text and the grade achievement of students whose reading competency is more than one year below the grade placement of the course text?

THE HYPOTHESIS

It is generally recognized that there is a correlation between students' achievement in a subject that requires reading and the ability of the students to cope with the material at their level of accomplishment without being frustrated or confused. A number of recent studies have further reinforced this correlation. In "Complexity as an Impediment to Learning," Santa and Burstyn focus on the readability problem faced by students: "Students of any age learn effectively when the difficult passages of their textbooks do not exceed their level of reading" (25 :508). After examining four extensive studies in this area, they conclude that "these results show clearly that many college freshmen find reading their textbooks an extremely frustrating task" (25:509). As far back as 1970, Frank Belcastro of the University of San Diego, identified the association between reading achievement and learning in his study of programmed mathematics materials. In his conclusions he states that: "As for reading levels themselves, subjects with high reading achievement scores were superior in learning algebra when compared to subjects with medium and low reading achievement scores" (Belcastro, 1 :317). Belcastro's results are supported by Grouws and Robinson in their study of the readability of classroom mathematics material. In their study, they conclude that:

> It is always a serious situation, and often a frustrating experience for the classroom teacher, when a student is achieveing poorly. . . . One factor to consider in diagnosing a student's difficulty is the reading level of the instructional material he is expected to use. The results of using material far above (or below) the student's reading ability may be causally related to his lack of achievement or poor attitude. (Grouws and Robinson, 12:715)

To minimize the frustration and confusion which may result in failure, reading experts (Betts, 2 and Harris & Sipay 13) theorize that the ideal learning environment would include a matching of the level of difficulty of the material with the reading competency of the student. Thus, the hypothesis of this study was:

> There is a significant difference in the grade achievement of students whose reading comprehension ability is no more than one year below the grade placement of the course text and the grade achievement of students whose reading comprehension ability is more than one year below the grade placement of the course text.

BACKGROUND AND SIGNIFICANCE OF THE STUDY

The system of higher education in the United States which evolved spontaneously with virtually no plans was shaped by ". . . the needs of the church, the influence of European cultural traditions, the independent spirit of a free country and a rapidly changing social and economic order" (Turnbull, 27:121-310). These rapid changes are most evident in the community college system. "In 1945,

16.3 percent of the 18 to 21 age group was enrolled in college: by 1968, the proportion had grown to 40.8 percent (Department of Health Education and Welfare, 1970, p. 67). This growth has been accompanied by increasing differentaition in higher education with the community colleges playing a pivotal role in this new division of labor" (Karabel, 19:121). In an effort to mitigate this differentiation, community college systems have, by and large, tended to have an "open door" policy which advocates available education for anyone who desires it.

Historically, the community colleges of California have subscribed to this "open door" policy, and the College of Alameda's policy of no assessment evaluation of incoming students is an example of this noble theory of education for everyone. However, this policy presents some very real educational problems. Of the myriad of problems presented by lack of entrance assessments, one of the major ones is that it precludes placement of students in subjects and at levels where they are most likely to have success. Courses in which reading is essential to grade achievement presents even greater problems. Although the instructor may be aware of the need to select textual material that is roughly commensurate with the reading ability of the students, no data is available on student reading competency. Thus, the students cannot be grouped according to reading competency with textual material matched to their ability. With

assessment evaluation of reading ability of incoming students, those students with reading problems (six months to two years below grade level) could be identified and placed in classes with material matched to their reading abilities.

The reading problems of nonretarded people is acknowledged worldwide, and it is ". . . significant that the ability to read is now being seen as both a necessity and a right, especially in the industrialized nations" (Tarnopol, 26:2). The federal government of the United States has given impetus to this general attitude through legislation enacted in 1975; the purpose of which is to assure that all people between the ages of three and twenty-one will have a ". . . free appropriate education . . . designed to meet their unique needs. . ." (Public Law 94-142, 23). Inherent in the concept of providing an appropriate education to meet individual needs, is the need to assess competency levels in order to introduce the most viable and pertinent instruction. Since reading comprehension is crucial to success in many fields of study, this area needs to be scrutinized in order to maximize the benefits of reading and to minimize the deleterious effects.

To maximize the benefits of reading, specialists in the field (Harris & Sipay, 13 and Zintz 28) generally subscribe to the principle of instruction identified by Betts (2) that instructional material should be matched to the

reading ability of the student. The desirability of matching student and material is certainly not a new idea. Richard E. Clark, Chairman, Area of Instructional Technology, Syracuse University, supports the matching theory. He suggests ". . . that the most fruitful approach to designing educational experiences lies in a consideration of the interaction between a mode of instruction and the relevant individual difference of students. . ." and that ". . . individualized instruction should imply the matching of knowledge about students' abilities and aptitudes with teaching material designed or selected to improve their performance and competence" (Clark, 6:468). This need for instruction that will take account of individual differences has long been recognized. "Such pioneers as Preston Search (1894), Frederick Burk (1913), and Carelton Washburne (1932), among others are noted for their efforts to solve it. The fact is, however, that their stress was on individual rather than individualized instruction. Fundamentally, they were concerned with adjusting the pace of instruction to the individual rather than with the variability of content and the manner of instruction for each individual student. In recent years, the stress has been on the need for differentiated materials and procedures in addition to varied pacing" (Duker, 8:382).

Although considerable research has been done on reading comprehension levels of elementary and secondary

students and the textual material for these ages, little research has been conducted in the post secondary field. In 1977, Carol Santa and Joan Burstyn studied the problem of reading level and achievement. In their study, "Complexity as an Impediment to Learning" they conclude that:

> There is strong evidence of a mismatch between college students' reading competencies and their assigned textbooks. Using a variety of readability measures, investigators have shown that many college textbooks are written on a level too difficult for their readers (Santa and Burstyn, 25:509).

In 1972, Terry Cline did a study entitled "Readability of Community College Textbooks." He states that "results clearly indicate that disparities exist between the readability of community college textbooks and the reading ability of their users" (Cline, 5:36).

These conclusions concerning the disparity between the reading level of the textbooks and the students' abilities to read them has been further verified in a study done by Maurice Kurzman. After analyzing the readability of twenty-three textbooks in social science, Kurzman concludes:

> This study confirms the findings of many other studies dealing with the problem. According to this study, the Social Science textbooks used by a group of college freshmen were in most cases many grade levels above their reading ability. For use in self-study, which is one of the main objectives of a college education, the textbooks were found to be too difficult for many of the students to comprehend adequately or properly (Kurzman, 20:20).

The fact that this disparity may be even broader when special groups are considered is implied in a study done by John Potts. In Beyond Initial Reading, Potts identifies the serious problem faced by students of lower socio-economic background:

> There appears to be little doubt that reading failure is more frequently found among children from lower socio-economic classes of society (classes IV and V on the Registrar General's classification) than it is among those from occupational classes I and II" (Potts, 22:74).

The results of these studies strongly imply that a large number of community college students are in double jeopardy since "at public community colleges . . . young people from low-income families form a larger portion of students in these colleges than in four-year institutions. . . " (Carnegie, 4:194).

The College of Alameda student population of 8,000 students, comprised of 65 percent ethnic minority, draws heavily from the lower-socio-economic classes of society. In an effort to meet the needs of the student population, a new Learning Assistance and Basic Skills (LABS) center was established, and some work is being done in the field of student reading assessment and textual reading levels. Reading levels of textual material are being established, and, upon instructor request and student consent, some classes are being assessed for reading comprehension competency. This, however, is being done on a

very limited basis because College of Alameda has a strong anti-test tradition. The prevailing attitude seems to be that there is some connection between students' success and the ability to comprehend the text, but since there is no comprehensive evaluation of reading competencies, instructors can only theorize that there is a significant connection between the students' reading competency level and the reading level of the text which is reflected in varying levels of success or non-success. If the institution is to fulfill its stated mission of meeting the individual educational needs of all students, then it is incumbent upon it to determine whether or not there is a significant difference in the grade achievements of students who are matched to the reading level of the textual material and those who are inappropriately matched to the reading level of the textual material.

The results of this study may serve as the rationale for determining the reading level of class texts and other reading material, apprising the teaching staff of the importance of matching reading competency of students to the reading level of the material, and for administering reading comprehension assessments to students involved in courses in which reading comprehension is crucial to grade achievement.

DEFINITION OF TERMS

For the purpose of this research, the following definitions apply:

1. Academic a chievement. Knowledge attained or skills developed in th e school subjects, usually designated by test scores or by m arks assigned by teachers or both (Duker, 8:2).

2. Achievemer t. "According to Adkins (1958) we may think of achieveme nt as consisting of (1) increases in the variety of stir ulus dimensions to which the learner will be sensitive and responsive, (2) increases in the number of new responses that will be made in the presence of familiar, or already discrimina ed, stimulus components, or (3) increases in the number of new responses to be made in novel stimulus situations" Harris, 14:1069-1096).

3. Elementary algebra. A course in algebra equivalent in content to the first year of algebra taught in the high school.

4. English I Composition and Reading. Reading and discussion of various prose forms such as the essay, the biography, and fictio ; development of skills of expository writing and reading a alysis (College of Alameda Catalog, 7:96).

5. Grade ach evement. A rating or evaluation of a pupil's achievement (nd, sometimes, of his character traits or behavior), often expressed on a letter scale, as A, B, C, D, F, or in percentages (Dictionary of Education, 11:263).

6. English 10B. Preparation for College Writing. Techniques of writing short expository essays, with emphasis on logical organization of ideas and adequately developed paragraphs (College of Alameda Catalog, 7:97).

7. Individualized instruction. A type of teaching-learning in which the teacher gives consideration to the individual learner by permitting the pupil to engage in choice-making in studying problems and to plan his own activities (Dictionary of Education, 11:305).

8. Intermediate algebra. A course in algebra equivalent in content to the second year of algebra taught in the high school.

9. Programmed instruction. Instruction utilizing a workbook, textbook or mechanical and/or electronic device programmed to help pupils attain a specified level of performance (Dictionary of Education, 11:306).

10. Reading ability. Tendency to read carefully, reasoning inductively, measured by rate of reading and by verbal ability and vocabulary (Dictionary of Education, 11:2).

11. Reading challenge level. The level above the reader's competency level but below the frustration level.

12. Reading competency level. The level at which the reader can work "smoothly at his own level of accomplishment" (Bond, 3:46).

13. Reading comprehension. "Comprehension in reading is generally defined as getting meaning from print. The word 'comprehension' means literally 'holding together;' thus, reading comprehension means that the reader holds together in his mind the elements of meaning coded by a writer into print" (Sanford, 24:373).

14. Reading frustration level. Generally described as the level of difficulty in reading at which a pupil experinces numerous errors in pronunciation, shows tension, and has a low level of comprehension of what he has read (Dictionary of Education, 11:474).

15. Reading level. The level of achievement reached by a reader, generally defined in terms of grade or stage of growth (Dictionary of Education, 11:474).

16. Reading problem. "Although there is no universal agreement as to what constitutes a reading problem, there is a generally accepted criterion that 'individuals whose reading achievement is X amount lower than their expected achievement based on measured intellectual capacity for learning' have a reading problem. However, there is also no universal agreement on the value of X. Figures cited in some research suggest that this criterion might be a range of from six months to two years difference between achievement and capacity" (Heilman, 16:453).

LIMITATIONS OF THE STUDY

The non-randomized control group posttest only design (Issac, 17:42-43) had internal validity advantages in that the history and pretesting variables were controlled by the elimination of a pretest. The selection variable was controlled through the selection of the samples on the basis of a standardized test. Statistical regression was not a problem because the sample groups were not chosen on the basis of extreme scores, but rather on the basis of those students whose reading competency was no more than one year below the grade placement of the course text and those students whose reading competency was more than one year below the grade placement of the course text. The effect of the maturation process, although not totally controlled, was certainly limited because the posttest was not a "one shot" test but was the culmination of the results of the students' achievements throughout the course. The major uncontrolled effects of maturation were the possibility of the students' reading levels increasing as a result of being in the class. Experimental mortality was a distinct disadvantage in the programmed mathematics classes. In these classes, attrition reduced the sample to a point that the results were not valid.

BASIC ASSUMPTIONS

For the purpose of this study it was assumed that:

1. the sample students' reading abilities were

representative of the reading abilities of the student population.

2. the students in all classes at College of Alameda had equal opportunity to achieve minimum course standards.

3. the professional academic standards were relatively equal in all classes.

4. the experimental group and the control group were relatively homogeneous in their preparation for the course because they had either completed prerequisite courses for the class, or they had been placed there as a result of a general skills test in that particular field.

5. the reading comprehension test was a reliable indicator of students' reading comprehension ability.

6. the assigned grades represented the students' total achievement in the class.

7. the student population of College of Alameda had a normal distribution of reading comprehension.

PROCEDURES FOR COLLECTING DATA

Four classes in which reading is essential to grade achievement were chosen. Two classes were English classes and two were mathematics classes which used programmed materials. The reading level of the textual material in the sample classes was established by the office of Learning Assistance and Basic Skills (LABS). The LABS

office used the Fry Readability Scale to determine reading levels of the assigned materials. To determine the reading level of a text using the Fry method, three passages are chosen at random and one hundred words are selected beginning with the first word of a sentence. The number of complete sentences and the number of syllables are determined for each passage. The average number of sentences and the average number of syllables are then used in conjunction with the Readability Graph to determine grade level. For a complete description see "Fry's Readability Graph: Clarification, Validity, and Extension to Level 17," Journal of Reading, (9).

Reading comprehension grade levels of the students in each of the four classes was determined by using the Gates-MacGintie Reading Comprehension Test, Form 3 (10). This nationally known and widely used test consists of fifty items. Students choose a "best" word to complete a given item. Raw scores are converted to grade level by the use of conversion tables supplied with the test packet. Information regarding validity and reliability of the Gates-MacGintie material can be obtained from the Seventh Annual Mental Measurements Yearbook, Volumes I and II, Editor, Oscar K. Buros, Highland ParK, New Jersey: Gryphon Press, 1972. The students in the chosen classes were administered this reading test by a member of LABS under the supervision of the Director. No announcement of the test was made in advance. The rationale for desiring the test information

and the consent of the students were handled immediately before the tests were administered. The social security number of each student was listed with the corresponding reading comprehension level as computed by the Gates-MacGintie system. The students whose reading comprehension level was no more than one year below the grade level of the course text constituted the control group, and those students whose reading comprehension level was more than one year below the grade level of the course text constituted the experimental group. At the end of the quarter, the grades for all students were collected from the instructors. For the purpose of this study, the following null hypothesis was tested:

> There is no significant difference in the grade achievement of students whose reading comprehension ability is no more than one year below the grade placement of the course text and those students whose reading competency is more than one year below the grade placement of rhe course text.

PROCEDURES FOR TREATING THE DATA

Students in each of the four classes chosen were tested to determine their reading competency grade levels. Using the reading competency grade level and the criterion stated in the null hypothesis, students in each class were separated into experimental and control groups. Mean reading grade levels for each group were determined and tested

for significant differences at the 0.05 level using the independent t-test. Because of the relatively small size of the groups studied in the English classes, a pooled variance (Hayslett, 15:102) was used in computing t-test values.

At the end of the quarter, academic achievement grades of students completing the courses were obtained from each instructor. Numerical values were assigned to the letter grades on the following basis: A = 4 points, B = 3 points, C = 2 points, and D = 1 point. No F grades were observed since grading policy at College of Alameda does not provide for F grades as a general practice. Using the assigned values, mean achievement grades were determined for the experimental and control groups in both of the English classes. These mean achievement grades were tested for significant differences at the 0.05 level using the independent t-test.

In addition to the t-test statistic, a Pearson Product-Moment Correlation Coefficient for reading level and grade received was determined from random samples from the two English classes.

Academic grades obtained for both of the programmed mathematics classes indicated such a high experimental mortality in the experimental groups that they were not compared to the control groups for determination of significant differences.

DATA RESULTING FROM THE STUDY

Table I shows the reading grade level of the assigned materials used in the four classes studied. The reading grade level, as determined by the Fry Readability Scale (9), was used as a means for selecting the experimental and control groups in each class.

TABLE I

READING GRADE LEVEL OF CLASS MATERIALS

Class	Text	Reading Level
English I	McCuen, W. Reading for Writers. New York: Harcort Brace, 1977.	12.0
English 10B	Mills, H. Commanding Paragraphs. Glenview, IL.: Scott, Foresman & Company, 1977.	9.8
Elementary Algebra (Programmed)	Gilligan, G., and Nenno, R. Basic Algebra. Santa Monica, 1977. Chapters 1 - 5.	11.0
Intermediate Algebra	Same as Elementary Algebra (Chapters 6 - 9)	11.0

Tables II and III show reading competency and grade achievement data for the experimental and control groups in the English I class. Experimental and control groups were chosen on the basis of students' reading competency grades, as determined by the Gates-MacGintie test and their relationship to the grade level of the assigned text. Significance

of t-test values in both tables, combined with the low statistical mortality, justifies rejecting the null hypothesis for this class.

TABLE II

READING COMPETENCY GRADE LEVEL DATA FOR ENGLISH I CLASS

Source	Experimental Group	Control
Number in Group	17	22
Mean Reading Level	10.4	12.5
Variance	1.74	.79
Standard Deviation	1.32	.89
Pooled Variance	1.20	
Result of t-test	t = 5.80	

TABLE III

COURSE GRADE ACHIEVEMENT DATA FOR ENGLISH I CLASS

Source	Experimental Group	Control Group
Number Completing Class	15 (88%)	19 (86%)
Mean Grade	2.41	3.09
Variance	.51	.85
Standard Deviation	.71	.92
Pooled Variance	.70	
Result of t-test	t = 2.34	

Table IV shows the Pearson Product-Moment Correlation Coefficient for reading grade level and course grade achieved for a random sample of twelve students in the English 1 class. The correlation coefficient of r = .520 implies that there is no statistically significant correlation between grade achievement and reading levels for this particular English I class at the 0.025 level.

TABLE IV

PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENT
GRADE ACHIEVEMENT VERSUS READING LEVEL
FOR ENGLISH I

Number in Random Sample	12
Critical r for n = 12	.576
Coefficient r =	.520

Tables V and VI show the reading competency and grade achievement of the experimental and control groups in the English 10B class. Statistically significant t-test values in both tables, combined with relatively low statistical mortality, justify a rejection of the null hypothesis for this class.

TABLE V

READING COMPETENCY GRADE LEVEL
DATA FOR ENGLISH 10B CLASS

Source	Experimental Group	Control Group
Number in Group	22	24
Mean Reading Level	8.6	11.3
Variance	1.02	1.80
Standard Deviation	1.0	1.3
Pooled Variance	1.4	
Result of t-test	t = 7.51	

TABLE VI

COURSE GRADE ACHIEVEMENT
DATA FOR ENGLISH 10B CLASS

Source	Experimental Group	Control Group
Number Completing Course	17 (77%)	20 (83%)
Mean Grade	2.3	3.4
Variance	.82	.49
Standard Deviation	.91	.70
Pooled Variance	.64	
Result of t-test	t = 4.15	

Table VII shows the Pearson Product-Moment Correlation Coefficient for reading grade level and course grade achieved for a random sample of fifteen students in the English 10B class. The correlation coefficient of r = .648 indicates that there is a statistically significant correlation between grade achievement and reading level for this particular English 10B class at the 0.025 level.

TABLE VII

PEARSON PRODUCT-MOMENT CORRELATION COEFFICIENT
GRADE ACHIEVEMENT VERSUS READING LEVEL
FOR ENGLISH 10B

Number in random sample	15
Critical r for n = 15	.514
Coefficient r =	.648

Tables VIII and IX show data regarding reading competency grade levels for students using programmed materials in two mathematics classes. T-test values from both tables indicate that there was a statistically significant difference between control and experimental groups based on reading competency.

TABLE VIII

READING COMPETENCY GRADE LEVEL
DATA FOR ELEMENTARY ALGEBRA CLASS

Source	Experimental Group	Control Group
Number in Group	21	45
Mean Reading Level	8.7	12.2
Variance	1.0	.98
Standard Deviation	1.0	.99
Result of t-test	t = 13.46	

TABLE IX

READING COMPETENCY GRADE LEVEL
DATA FOR INTERMEDIATE ALGEBRA CLASS

Source	Experimental Group	Control Group
Number in group	24	35
Mean Reading Level	7.8	12.6
Variance	2.15	.52
Standard Deviation	1.47	.72
Result of t-test	t = 14.8	

Tables X and XI both show abnormally high statistical mortality for students in the experimental groups in the algebra classes. Because of the high mortality, grade achievement comparisons were not done for these groups.

TABLE X

COURSE COMPLETION DATA
ELEMENTARY ALGEBRA

Source	Experimental Group	Control Group
Number Starting	24	35
Number Completing	8 (33%)	21 (60%)

TABLE XI

COURSE COMPLETION DATA
INTERMEDIATE ALGEBRA

Source	Experimental Group	Control Group
Number Starting	21	45
Number Completing	2 (10%)	23 (51%)

CONCLUSIONS AND SIGNIFICANCE

When this study was first conceived, it was anticipated that there would be significant differences in both mean reading competency levels and mean achievement grades between those students who were and were not closely matched to the reading level of the class material. Tables II, V, VIII, and IX clearly show that there are significant differences between mean reading competency levels for matched and unmatched students. Although the main thrust of the study was to investigate grade achievement, the fact that each class tested showed a significant difference in reading level between the experimental and control group is considered a major contributing factor to the results of the t-tests shown in Tables III and VI.

Since t-test values for grade achievement in both English classes (Tables III and VI) exceed the critical t of 1.960, the null hypothesis was rejected.

The correlation between reading competency level and grade achievement is further established in Tables IV and VII which show coefficients of correlation near or above critical values. (For critical values of r for a given n, see Newmark (21:453). Although the correlation coefficient (r=.520 is not statistically significant for the English I class, its nearness to the critical value (r_c = .576) and the value of t-2.34 (Table III) suggests that the study be repeated to further establish definitive results.

The high experimental mortality experienced by the experimental groups in the algebra classes suggests that in future studies some control variable other than reading competency be used to determine experimental and control groups. These high mortality rates suggest that a follow-up study be done to analyze the relationship between reading competency and attrition in these classes. From the results of Tables X and XI, it would appear that there may be a causal relationship between low reading competency levels in relation to the class text and attrition.

From the results of this study, it is recommended that (1) all current and proposed class texts and other reading materials be tested for reading levels and instructors and students be informed of the results, (2) appropriate administrative personnel endeavor to alert the instructional staff to the importance of matching the reading competency levels of the students and the class materials, and (3) that students who will be involved in courses in which reading comprehension is crucial to grade achievement be given the opportunity to determine their reading competency levels.

REFERENCES

1. Belcastro, Frank P. "Programmed Algebra and Reading Achievement," High School Journal, (February, 1970), 310-318.

2. Betts, E. Foundations of Reading Instruction, New York: American Book Company, 1946.

3. Bond, G., & Tinker, M. Reading Difficulties: Their Diagnosis and Correction. New York: Appleton-Centry Crofts, 1973.

4. Carnegie Commission on Higher Education. "Higher Education: Who Pays? Who Benefits? Who Should Pay?" A Digest of Reports of the Carnegie Commission on Higher Education. New York: McGraw-Hill Book Co.,1974.

5. Cline, Terry A. "Readability of Community College Textbooks," Journal of Reading, (October, 1972), 33-37.

6. Clark, Richard E. "Research and Practice in Instructional Media," Handbook on Contemporary Education, ed. Steven E. Goodman. New York: R.R. Bowker Company, 1976.

7. College of Alameda Catalog. Alameda, California: 1978-1979.

8. Duker, Sam. "Individualized Reading," The Encyclopedia of Education, 1971, Vol. 7.

9. Fry, Edward. "Fry's Readability Graph: Clarification, Validity, and Extension to Level 17," Journal of Reading, (December, 1977).

10. Gates, Arthur I., and Walter MacGintie. Gates MacGintie Reading Tests. New York: Teachers College Press, Columbia University, 1964.

11. Good, Carter V., ed. Dictionary of Education. 3rd ed. New York: McGraw-Hill Book Company, 1973.

12. Grouws, Douglas, and Robinson, Richard D. "Some Ideas Concerning the Readability of Classroom Mathematics Materials," Social Science and Mathematics, (December, 1973),711-716.

13. Harris, A., & Sipay, E. How to Increase Reading Ability. New York: David McKay, 1975.

14. Harris, Theodore L. "Reading," Encyclopedia of Educational Research. 4th ed., ed. Robert L. Ebel. London: The MacMillian Company, 1969.

15. Hayslett, H. J., Jr. Statistics Made Simple. Garden City, New York: Doubleday & Co., Inc., 1968.

16. Heilman, Arthur W. Teaching Reading. 2d ed. Columbus: Charles E. Merrill Publishing Company, 1967.

17. Issac, Stephen. Handbook in Research and Evaluation. San Diego: Edits Publishers, 1976.

18. Jorgenson, Gerald W. "Relationship of Classroom Behavior to the Accuracy of the Match Between Material Difficulty and Student Ability," Journal of Educational Psychology, 69, No. 2 (1977), 24-32.

19. Karabel, Jerome. "Community Colleges and Social Stratification," The Educational Establishment, ed. Edwin M. Schur. Englewood Cliffs: Prentice-Hall, Inc., 1974.

20. Kurzman, Maurice, "The Reading Ability of College Freshmen Compared to the Readability of Their Texts," Reading Improvement, Vol. II, No. 2, (Fall, 1974) 13-25.

21. Newmark, Joseph. Statistics and Probability in Modern Life. San Francisco: Rinehart Press, 1975.

22. Potts, John. Beyond Initial Reading. New York: Schocken Books, 1976.

23. Public Law 94-142, 94th Congress, S. 6 Act "To amend the Education of the Handicapped Act to provide educational assistance to all handicapped children, and for other purposes." November, 1975.

24. Sanford, Adrian B. "Reading Comprehension Skills," The Encyclopedia of Education, Vol. 7., 1971.

25. Santa, Carol M., and Burstyn, Joan N. "Complexity as an Impediment to Learning," Journal of Higher Education, Vol. XLVIII, No. 5, (September/October, 1977), 508-518.

26. Tarnopol, Lester and Tarnopol, Muriel, Reading Disabilities: An International Perspective. Baltimore: University Park Press, 1976.

27. Turnbull, William W. "Special Institutions in Systems of Higher Education," Higher Education: From Autonomy to Systems, ed. James A. Perkins. New York: International Council for Educational Development, 1972.

28. Zintz, M. The Reading Process. 2nd ed. Dubuque, Iowa: William C. Brown, 1975.

ERIC Clearinghouse for Junior Colleges
96 Powell Library Building
University of California
Los Angeles, California 90024